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Schattke, Kaspar ; Brandstätter, Veronika ; Taylor, Geneviève ; Kehr, Hugo M

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Flow on the Rocks:

Motive-Incentive Congruence Enhances Flow in Rock Climbing

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**Abstract**

Flow is a state of optimal experience in which people get fully absorbed by a smoothly running activity that they pursue for the sake of it. Based on the classical approach to motivation, recent theoretical considerations suggest that incentives provided by the current activity that are congruent with one's implicit motives will lead to flow. In a field experiment, we examined wall climbers' achievement motive and compared their flow on four climbing routes with varying achievement incentive strengths. Only climbers with a high achievement motive experienced more flow after repeating an intra-individually skill exceeding route, which they had failed before. Performing better was a strong achievement incentive. The findings suggest that motive-incentive congruence is another important precondition for flow.

**Keywords:** Flow Experience; Motive-Incentive Congruence; Implicit Motives; Achievement Motive; Hope of Success; Fear of Failure; Motive-Behavior Congruence; Classical Approach to Motivation

# Flow on the Rocks:

## Motive-Incentive Congruence Enhances Flow in Rock Climbing

### 1. Introduction

Flow is a state of optimal experience in which people are fully focussed, concentrated and absorbed in a smoothly running activity. In flow, action and awareness merge and people have a sense of control. They lose their sense of time and forget even themselves. This state is characterised by enjoyment of the activity (Csikszentmihalyi, 1975; 1990). Kehr (2004) has referred to flow as “a special case of intrinsic motivation” (p. 490).

Flow has important cognitive, affective and behavioural consequences, such as high academic performance (Engeser & Rheinberg, 2008), increased creativity (Csikszentmihalyi, 1990), positive affect (Schüler, 2007) and happiness (Moneta & Csikszentmihalyi, 1996). The preconditions for flow are: clear goals, immediate feedback, and a balance between task demands and personal skills at a high level (Csikszentmihalyi, 1990; Keller & Landhäuser, 2011; Moneta & Csikszentmihalyi, 1996). In fact, Engeser (2012) points out that the balance is an important pre-condition for flow but, alone, it is not sufficient to explain the flow phenomenon. Recent studies show that the relationship between demands-skill balance and flow is moderated by the achievement motive. In other words, not everyone experiences flow to the same degree when skilfully performing a demanding activity (Engeser & Rheinberg, 2008; Schüler, 2007).

Why are motives a relevant determinant of flow and how do motives interact with the incentives from the environment in order to affect flow? The present contribution refines the theoretical arguments that have been developed to explain the impact of the implicit achievement motive in combination with incentives from the environment on flow, beyond the demands-skill-

balance. We provide first empirical evidence for the suggested positive association between motive-incentive congruence on flow.

### 1.1. The Classical Approach to Motivation

According to the *classical approach to motivation* (Lewin, 1931; Rheinberg, 2008), motivation results from an interaction between incentives and motives (Schultheiss, Kordik, Kullmann, Rawolle, & Rösch, 2009). Incentives are emotionally arousing characteristics of the environment whereas motives are relatively stable, affectively charged preferences for a certain class of incentives (McClelland, 1987). In other words, if a situation provides incentives (e.g., challenges) that a person is predisposed to enjoy (in this case people with a high achievement motive), he or she will be motivated to pursue the respective activity.

McClelland, Koestner, and Weinberger (1989) point out that implicit motives “predict spontaneous behavioral trends over time” (p. 691). They are aroused by incentives experienced in pursuing an activity and energise behaviour through enjoyment and pleasure. The implicit achievement motive or need for achievement (dealing with a standard of excellence) seems to relate to the flow concept particularly well because “an achievement incentive is a moderate challenge” (McClelland, 1987, p. 183), which parallels the demands-skills-balance put forth by Csikszentmihalyi (1990). It can be divided into a *hope* (of success) and *fear* (of failure) component. People with a high implicit achievement motive do better after self-referenced negative feedback in task-focussed settings (Brunstein & Maier, 2005) probably because “doing something better is the natural incentive for the achievement motive” (McClelland, 1987, pp. 227–228). Hence, “those scoring high in *n*[eed] Achievement do better at challenging tasks (those with a moderate probability of success) than do those low in *n* Achievement, because such tasks provide the maximum incentive of feeling good from doing something better” (McClelland

et al., 1989, p. 693). Thus, when people with a high achievement motive pursue an activity providing strong achievement incentives, they will be motivated and perform well. In comparison, in situations with weak achievement incentives (i.e., very easy task), even people with a high achievement motive will be less motivated to perform well because the situation lacks opportunity to arouse the motive.

## **1.2. The Present Research**

We aimed to test the proposition that congruence between motives and thematically concordant incentive increases flow. To our knowledge, no studies to date have systematically varied the achievement incentive strength in combination with the achievement motive. The present research aims to bridge this gap in research. To that effect, we assessed the achievement motive of indoor wall climbers and manipulated the strength of achievement incentives on four different climbing routes. Subsequently, we assessed the climbers' flow right after each respective climbing route. We expected that only climbers with a high achievement motive would experience more flow on routes providing strong compared to weak achievement incentives.

In this context, a route that provides only weak achievement incentives, should neither be challenging nor should it provide the opportunity to increase ones performance or skills. For example, an easy route that climbers have mastered previously should provide weak achievement incentives. On the other hand, a route with strong achievement incentives should provide a challenge to the climbers in the sense that it is not easy to master but feasible at the same time. For example, a route with a difficult level that lies slightly above one's current skill level, should provide a strong achievement incentive (McClelland, 1987; Schiepe-Tiska & Engeser, 2012). Another aspect that constitutes an achievement incentive, is the opportunity to increase ones

performance after prior failure (Brunstein & Maier, 2005) as well as a moderate likelihood of success (i.e., 40-50%; Atkinson, 1957; Brunstein & Heckhausen, 2008; Heckhausen, 1963). For example, this would be the case when climbing a route again, after having previously failed it, that is too difficult relative to one's current skill level but not impossible to master. In other words, the likelihood of success should be lower than 50% but not too low.

## **2. Material and Method**

### **2.1. Design**

We used an aptitude-treatment design (West, Aiken & Krull, 1996) in which the achievement motive represented the aptitude (between-subjects) and the different climbing routes represented the treatment (within-subjects). The routes differed in terms of their achievement incentives strength (e.g., challenge, likelihood of success). Flow was the dependent variable.

Route 1 provided intra-individually only weak achievement incentives as it was too easy relative to the climbers' abilities and did not provide any opportunity for improvement. Route 2 provided an intra-individually moderate challenge, as it was neither too easy nor too difficult, which, as stated above, can be seen as an incentive for people with a high achievement motive (Schiepe-Tiska & Engeser, 2012). Hence, we expected an increase in flow from the easy to the challenging route but only for climbers with a high achievement motive.

Route 3 was climbed twice. The first attempt was too difficult relative to the climbers' abilities. It should therefore undermine all climbers' perceived abilities for this route and counteract their flow regardless of their achievement motive (Csikszentmihalyi, 1990; Kehr, 2004). Hence, we expected a decrease in flow from the challenging to the difficult route, unaffected by the achievement motive (main effect).

1       The second attempt of Route 3 incorporated the experience of having tried it before. Since  
2       Route 3 was too difficult relative to the climbers' abilities, one could expect a rather poor  
3       performance on it. Climbers would be instantly aware of this failure; and this could be seen as  
4       self-referenced negative feedback. This has been shown to increase performance in people with a  
5       high achievement motive (Brunstein & Maier, 2005). Moreover, giving climbers the chance to  
6       climb the same route again provides the opportunity for doing it better than before, which is an  
7       incentive for climbers with a high achievement motive. Hence, we expected an increase in flow  
8       from the first to the second attempt of Route 3 but only for climbers with a high achievement  
9       motive.

## 10       **2.2. Participants**

11       We initially observed  $N = 31$  indoor wall climber but had to remove seven climbers who did  
12       not climb all four routes. The design required data for all four conditions in order to perform the  
13       analysis. We therefore ran the analysis only with complete data sets. The remaining  $N = 24$  (6  
14       females) participants were 21 to 41 years old ( $M = 26.21$ ;  $SD = 3.99$ ). Of these, 15 climbers were  
15       students and the rest were currently working. Ten climbers had a university degree and 14 had a  
16       high school diploma. For safety reasons, only experienced climbers were accepted (i.e., level 5  
17       and above on the UIAA scale see below). The climbers were recruited in two climbing gyms in  
18       the Munich area. We did not find any differences in the data between those two gyms.

## 19       **2.3. Measures**

### 20       **2.3.1. Achievement Motive**

21       We assessed the achievement motive using the Picture Story Exercise (PSE), the research  
22       version of the Thematic Apperception Test (TAT; Murray, 1938), in which participants write  
23       imaginative stories in response to ambiguous picture cues (McClelland, 1987; Pang &



Schultheiss, 2005). In order to increase the measure's sensitivity for the achievement and sport context, we presented six sport- and achievement-related pictures. The pictures in the following order were "Gymnast", "Bicycle race", "Alpinist", "Trapeze artist", "Snowboarder in half pipe", and "Boxer" (Pang, 2010a).

These stories were later content-coded for the two components of the achievement motive *hope of success* and *fear of failure* using Heckhausen's (1963) well-established scoring system, which is "the most systematic and comprehensive, theory driven need achievement scoring system available" (Pang, 2010b, p.53; cf. Schultheiss, 2001, 2013; Pang, 2010a,b; for more information about the scoring process). In more detail, *hope of success* consists of the six sub-categories (1) *Need for success*, (2) *Instrumental activity* to succeed, (3) *Expectation of success*, (4) *Praise*, (5) *Positive affect* related to success and (6) *Success theme*, that is whether the whole story is embedded in a success theme. For example, a participant writes after seeing the Alpinist picture, on which one sees a mountain climber who is about to reach the summit of a snow covered mountain, "*I am sure we will manage to reach the summit*". This can be scored for (3) *Expectation of success* because it clearly expresses the expectation of being successful in ones goal.

Fear of failure consists of seven sub-categories, namely (1) *Need to avoid failure*, (2) *Instrumental activity* to avoid failure, (3) *Expectation of failure*, (4) *Criticism*, (5) *Negative affect*, (6) *Failure* and (7) *Failure theme*. For example, "*They did not manage to reach the summit*" could be scored for (6) *Failure*. Each category can be scored ones in each story. The number of categories found in each story will be summed up for *hope of success* and *fear of failure* separately. The sums of all pictures and categories constitute the raw values for *hope of*

1 *success* and *fear of failure*, respectively (see Heckhausen, 1963; Pang 2010a,b; Schattke, 2011;  
2 and Schultheiss, 2001 for detailed instructions).

3 For example, it has been successfully used by Engeser and Rheinberg (2008) in order to  
4 assess the implicit achievement motive. A trained scorer, who had previously achieved more  
5 than 85% concordance with the calibration materials, coded all stories. Another equally well  
6 trained scorer coded 30% of the stories in order to assess inter-rater reliability, which was  
7 adequate (92% overall concordance, 95% for *hope of success*, 85% for *fear of failure*).

### 8 **2.3.2. Flow**

9 We assessed flow using the Flow Short Scale (Engeser & Rheinberg, 2008). This  
10 measure assesses flow using ten items and can be divided into two sub-dimensions, namely  
11 *fluency of performance* (e.g., *My thoughts/activities run fluidly and smoothly*) and *absorption by*  
12 *activity* (e.g., *I am totally absorbed in what I am doing*). We used the mean values of those two  
13 factors in this paper. Participants rated their agreement with each item on a seven-point scale  
14 ranging from 1 “not at all” to 7 “very much”.

15 The Flow Short Scale has been successfully used to compare flow in achievement- versus  
16 non-achievement-oriented sport contexts in the field as well as in the laboratory (Schüler, 2010).  
17 The scale has been shown to predict learning performance and affect in school and university  
18 settings but also succeeding in the computer game “Pac Man”. The Flow Short Scale has further  
19 been shown to be affected by the balance between task demands and skills based on correlational  
20 and, more importantly, by experimental evidence (Engeser & Rheinber, 2008; Schüler, 2007). In  
21 those studies, the reliability coefficients were consistently  $\alpha > .70$ , not seldom  $\alpha = .80-.90$ . This  
22 evidence supports our notion that the Flow Short Scale is a reliable and valid measure. In this  
23 study, the internal consistencies were high ( $\alpha = .85-.93$ , see Table 1).

### 2.3.3. “Onsight” Performance Level

In wall climbing, the “onsight” performance level refers to the difficulty level of a route a climber is able to succeed in one pass and without falling or pausing. “Onsight” means that a climber has never tried the route before. Climbers are well aware of their personal “onsight” performance level since it refers to the most difficult route a climber has mastered “onsight”. Consequently, the experimenter asked each climber for their “onsight” performance level using values based on the “UIAA-Scale” of the International Mountaineering and Climbing Federation. This scale has 12 levels and our participants varied between level 5 and 9 with an average of  $M = 6.70$  ( $SD = 0.89$ ; cf. Schattke, 2011).

### 2.4. Procedure

Before participating, climbers accomplished an online pre-test in which they completed the PSE. At the climbing wall, the experimenter, an experienced climbing teacher, explained the procedure and asked the climbers for their “onsight” performance level. Each participant climbed three different routes and repeated the last one.

Based on the climbers’ performance level, the climbing teacher determined the difficulty levels for each climber’s routes individually. Accordingly, the actual difficulty levels for each route varied between the climbers depending on their performance level. However, the differences of difficulty levels between the routes were the same for everybody even though the absolute difficulty level for the same route between climbers might have varied. Therefore, everybody received the same treatment in the sense that the first route was too easy, the second route provided an optimal challenge, and the third and fourth were too difficult.

The difficulty levels between these routes based on the UIAA-scale differed significantly ( $F(2, 69) = 36.36, p < .001, \eta^2 = .52$ ). Climbers started with Route 1 ( $M = 4.96; SD = 1.06$ ),

which was intra-individually clearly below each climber's performance level. Route 2 ( $M = 6.50$ ;  $SD = 0.85$ ) was significantly more challenging than Route 1 ( $t(69) = 5.80, p < .000, \eta^2 = .32$ ) and was intra-individually slightly above each climber's usual performance level. Route 3 ( $M = 7.18$ ;  $SD = 0.85$ ) was significantly more difficult than Route 2 ( $t(69) = 2.52, p = .007, \eta^2 = .08$ ) and intra-individually clearly above each climber's performance level. Participants climbed the difficult route twice.

The experimenter observed the climbers during the whole time they were climbing in order to assess whether they succeeded or failed the route. All climbers succeeded Route 1 and 2 but nobody mastered the difficult Route 3 on their first attempt. On their second attempt, 37.5% of the climbers succeeded. After each route, when the climber was back on the ground, the experimenter administered the flow questionnaire (cf. Schattke, 2011).

### 3. Results

As achievement motive variables, we employed the *hope of success* ( $M = 11.13$ ;  $SD = 3.46$ ) and *fear of failure* ( $M = 4.13$ ;  $SD = 3.19$ ) scores derived from the Heckhausen (1963) coding system. Fear of failure ( $r = .51, p = .01$ ) but not hope of success ( $r = -.03, p = .89$ ) correlated significantly with protocol length (i.e., number of words). Thus, we corrected both variables for protocol length using regression and standardised them. Kolmogorov-Smirnov tests indicated that neither hope of success ( $z = 0.73, p = .66$ ) nor fear of failure ( $z = 0.44, p = .99$ ) differed significantly from normal distribution. The same was true for the performance level ( $z = 0.47, p = .98$ ) as well as for the dependent flow variables on Route 1 ( $z = 0.68, p = .75$ ), Route 2 ( $z = 1.05, p = .22$ ), Route 3-first attempt ( $z = 0.41, p = .99$ ), and Route 3-second attempt ( $z = 0.62, p = .84$ ). The minima and maxima of the standardised values for hope of success ( $Min = -1.51, Max = 2.03$ ) and fear of failure ( $Min = -1.51, Max = 2.30$ ) were within the limits of three standard deviations

( $|z| < 3.00$ ), which indicates no severe outliers (Field, 2009). The same was true for the standardised performance level ( $Min = -1.47$ ,  $Max = 2.33$ ) as well as for the standardised dependent flow variables on Route 1 ( $Min = -2.98$ ,  $Max = 1.82$ ), Route 2 ( $Min = -1.92$ ,  $Max = 1.13$ ), Route 3-first attempt ( $Min = -2.77$ ,  $Max = 1.50$ ), and Route 3-second attempt ( $Min = -2.28$ ,  $Max = 1.46$ ).

To test our expectations, we calculated a General Linear Model (GLM) with *hope of success* and *fear of failure* as continuous independent between-subjects variables, the different routes as independent within-subjects variable, and the flow scores of the different routes as dependent variables. We also controlled for performance level because it was related to flow on both attempts of Route 3.

=====

Please insert Table 1 about here

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Overall, the performance level was positively related to flow experience ( $F(1, 19) = 6.60$ ,  $p = .019$ ,  $\eta^2 = .26$ ) but we did not find between-subjects main effects for *hope of success* ( $F(1, 19) = 1.53$ ,  $p = .23$ ,  $\eta^2 = .08$ ), *fear of failure* ( $F(1, 19) = 1.61$ ,  $p = .22$ ,  $\eta^2 = .08$ ), or for their interaction ( $F(1, 19) = 0.02$ ,  $p = .89$ ,  $\eta^2 = .00$ ).

However, we found a significant within-subjects main effect for the different routes ( $F(3, 57) = 3.41$ ,  $p = .023$ ,  $\eta^2 = .15$ ). Repeated contrasts revealed no differences between Route 1 and 2 ( $F(1, 19) = 1.32$ ,  $p = .27$ ,  $\eta^2 = .07$ ) and between the two attempts of Route 3 ( $F(1, 19) = 0.66$ ,  $p = .43$ ,  $\eta^2 = .03$ ) but a marginally significant differences in flow ( $F(1, 19) = 3.85$ ,  $p = .065$ ,  $\eta^2 = .17$ ) between Route 2 ( $M = 5.70$ ,  $SD = 0.89$ ) and Route 3-first attempt ( $M = 4.95$ ,  $SD = 1.10$ ). On

average, climbers experienced more flow on the challenging Route 2 than on the difficult Route 3-first attempt, which is consistent with our expectations.

More importantly, we found a significant interaction effect between *hope of success* and the different routes ( $F(3, 57) = 3.99, p = .012, \eta^2 = .17$ ) but not between *fear of failure* and the routes ( $F(3, 57) = 0.92, p = .44, \eta^2 = .05$ ). The 3-way interaction between the routes, *hope of success*, and *fear of failure* remained non-significant ( $F(3, 57) = 2.03, p = .12, \eta^2 = .10$ ). To further examine the interaction between *hope of success* and the routes, we computed repeated contrasts. The interactions with *hope of success* between Route 1 and 2 ( $F(1, 19) = 1.02, p = .33, \eta^2 = .05$ ) and between Route 2 and Route 3-first attempt ( $F(1, 19) = 0.11, p = .74, \eta^2 = .01$ ) were not significant. However, the interaction contrast with *hope of success* between the first and second attempt of Route 3 was significant ( $F(1, 19) = 7.00, p = .016, \eta^2 = .27$ ). In other words, only climbers with a strong positive component of the achievement motive (i.e., *hope of success*) increased their flow when climbing the too difficult Route 3 again. This confirms our expectations for Route 3-first and second attempt but not for Route 1 and 2. Figure 1 illustrates the findings.

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Please insert Figure 1 about here

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As mentioned above, not all participants excelled the second attempt of Route 3. An exploratory MANOVA, using Pillai's Trace, revealed multivariate differences between successful and unsuccessful climbers ( $V = 0.52, F(4, 19) = 5.06, p = .006, \eta^2 = .52$ ) on various variables (see Table 1): Successful climbers had significantly higher values in flow ( $F(1, 22) = 6.71, p = .017, \eta^2 = .23$ ) and *hope of success* ( $F(1, 22) = 7.29, p = .013, \eta^2 = .25$ ), but lower

values in *fear of failure* ( $F(1, 22) = 4.76, p = .04, \eta^2 = .18$ ) than climbers who failed Route 3-second attempt. Interestingly, successful and unsuccessful climbers did not differ significantly ( $F(1, 22) = 2.57, p = .12, \eta^2 = .10$ ) in terms of their prior “onsight” performance level. This indicates that high flow, high *hope of success*, and low *fear of failure* might positively affect the climbing performance after failure on a skill exceeding route, independent from skills.

#### 4. Discussion

We aimed to test the hypothesis that the congruence between motives and thematically concordant incentives increases flow, which we tested with indoor wall climbers. We had expected to find interactions between the implicit achievement motive and the achievement incentives provided by an easy, challenging, and two difficult climbing routes on flow. Surprisingly, we did not find any effects between an easy route, which possessed only weak achievement incentives, and a challenging route with strong achievement incentives. However, as expected, flow decreased, albeit just marginally, for all climbers from the challenging route to a route that was too difficult relative to each climber’s abilities. Most importantly, flow increased significantly when climbing the difficult route for the second time but only for climbers with a strong hope component of the achievement motive (i.e., *hope for success*). Interestingly, post hoc analyses revealed that climbers who succeeded the second attempt of Route 3 experienced more flow, had a higher hope for success, and a lower fear for failure than climbers who failed Route 3 when climbing it again.

##### 4.1. Implications

The increase of flow from the first to the second attempt of the difficult Route 3 for climbers with a high achievement motive supports the hypothesis that motive-incentive congruence enhances flow. Because everybody failed Route 3 the first time, climbing it a second time

provided an opportunity to increase one's performance compared to the first trial, which can be seen as an achievement incentive (Brunstein & Maier, 2005). Moreover, the moderate likelihood of success constitutes an achievement incentive (Atkinson, 1957; Brunstein & Heckhausen, 2008). Those findings are in line with the theory and prior findings. However, why did we not find the expected increase in flow from the easy to the challenging route?

Following Csikszentmihalyi's (1975; 1990) approach, the balance between one's skill and the current task demands provides an optimal challenge. In our study, the difficulty level of the "challenging" route was slightly above the climbers' "onsight" performance level. Hence, we assumed that an optimal challenge according to that approach was at place. Moreover, this balance and the resulting challenge can be interpreted as an achievement incentive (Schiepe-Tiska & Engeser, 2012) and, therefore, should have led to a flow increase, particularly in climbers with a high achievement motive. However, this challenge seems to not have increased flow significantly compared to the easy condition, in which there was an imbalance between demands and skills and, in consequence, weaker achievement incentives. It is possible that the balance of the "challenging" route alone was not a sufficient incentive to arouse the climbers' implicit achievement motive. Perhaps the difficulty level should have been higher than just *slightly* above the climber's "onsight" performance level.

Based on Atkinson's (1957) Risk-Taking Model, one could argue that the success rate of 100% on the "challenging" route appears like a pretty poor achievement incentive, which would mean that the "challenging" route did not arouse the implicit achievement motive because it was ultimately not challenging enough. This would explain why we did not find the expected effects here. Future studies that attempt to manipulate achievement incentives, should do that by



1 adjusting the self-referenced feedback inherent in the task rather than the mere balance between  
2 task demands and skills.

3 Otherwise, our results support the notion that a lack of perceived abilities or skills for the  
4 current activity impedes flow (Csikszentmihalyi, 1990; Kehr, 2004). This is indicated by the  
5 decrease in flow from the challenging Route 2 to the first attempt of the difficult Route 3, which  
6 is unaffected by the achievement motive. Based on Csikszentmihalyi's (1975; 1990) balance  
7 hypothesis, one would expect that flow is also lower on a route that is too easy (Route 1)  
8 compared to a route that balances demands and skills (Route 2). We did not find significant  
9 differences between the routes. Kehr (2004) suggests that one might still experience flow in an  
10 activity that is too easy as long as one pursues an affectively arousing activity. One could argue  
11 that climbing per se leads to affective preferences because it is an intrinsically motivating  
12 activity (i.e., doing something for its own sake and its enjoyment), at least for practised climbers,  
13 and consequently elicits some flow for all climbers (flow is between 5 and 6 on a 7-point scale  
14 on Routes 1 and 2). However, the failure experience of Route 3 with the subsequent opportunity  
15 to do better might then have affected only those with a high achievement motive, as shown by  
16 the data.

17 We also want to point out that in previous studies, higher flow seemed to be associated with  
18 better performance (e.g., Aubé, Brunelle, & Rousseau, 2014; Engeser & Rheinberg, 2008;  
19 Jackson, Thomas, Marsh, & Smethurst, 2001; MacDonald, Byrne, & Carlton, 2006; Schöler,  
20 2007). In our study, we have performance data for Route 3-second attempt. It is important to  
21 remember that all climbers excelled Routes 1 and 2 and all climbers failed the difficult Route 3-  
22 first attempt. However, when trying it again, only some climbers were successful and had more  
23 flow, higher hope of success and lower fear of failure. Of course, in terms of flow, we cannot

infer causality because flow was measured right after the climbers finished the route. Therefore, they naturally knew whether they were successful or not. On the other hand, *hope of success* and *fear of failure* were measured prior to the whole climbing exercise. This means that climbers high on both variables were objectively better at mastering the second attempt of Route 3. They seem to have made better use of their experience from their failure on their first attempt in terms of learning, which might have led to a perception of the difficult route as more manageable when trying it for the second time.

#### 4.2. Future Research

Traditionally, flow research has focused on the demand-skill balance as the main precondition for flow (Keller & Landhäuser, 2011). This seems to be too simplistic and, as Engeser (2012) pointed out, there is common agreement among flow researchers that the balance alone “presents a central aspect but not the whole picture” (p. 190). For example, Engeser and Rheinberg (2008) demonstrated that the perceived importance of the task moderated the relationship between the demands-skills-balance and flow. Baumann and Scheffer (2011) provide evidence for a flow motive as another antecedent of flow as well as a mastery orientation mediated by affective change (Baumann & Scheffer, 2010). Abuhamdeh and Csikszentmihalyi (2009) discussed an intrinsic motivation orientation as another facilitator of flow. As discussed above, Engeser and Rheinberg (2008) as well as Schüler (2007) provided evidence that the implicit achievement motive interacts with the balance when predicting flow. Our findings confirm this interactive nature of the implicit achievement motive on flow.

In light of those findings, it seems to be justified to look at the implicit achievement motive’s role in regard to flow more systematically in future research. We propose to theoretically embed Csikszentmihalyi’s (1990) flow model in McClelland’s (e.g., 1987) interactive motive-incentive

framework as outlined above (also see Kehr, 2004). This approach would allow for a bigger picture by including individual differences in the flow model and by differentiating different motivational themes (e.g., achievement, power, affiliation). It further proposes a mechanism through which the motive has an impact on flow, namely the alignment of situational incentives with one's motive dispositions. Moreover, if one considers that an aroused implicit motive might lead to affective preferences (Kehr, 2004) and that the rewarding experience of an aroused motive could be a motive specific affect (Job & Brandstätter, 2009) one could further assume the motive specific affect as mediating mechanisms. Schiepe-Tiska (2013) provides first evidence for this assumption. Future research should therefore include affect as mediating mechanisms on flow experience.

Finally, the framework allows for different motivational themes. Consequently, the impact of implicit motives on flow should not be limited to the achievement domain. Indeed, Schiepe-Tiska (2013) showed that flow can also result from an aroused power motive. Future research should further examine the role of the power motive in different sports that include competitive or influencing activities such as fencing, football, or playing chess as well as activities that include leadership (Schattke & Kehr, 2009; Schiepe-Tiska & Engeser, 2012). Aubé and colleagues (2014) showed that flow is associated to work team performance. Here, it would be interesting to include the impact of the power motive in leadership effects in the analysis. Not least, future research should further look at flow in the affiliation domain (Schiepe-Tiska & Engeser, 2012).

### **4.3. Limitations**

Most prominently, the small sample size decreases the external validity. However, we found significant effects with medium to strong effect sizes, which justifies the small sample size.

Nevertheless, a replication of our findings is necessary to rule out whether this is a random effect. Furthermore, we did not vary the order of the routes, which were our experimental conditions. Therefore, we cannot rule out order effects, which may have decreased our internal validity. On the other hand, the observed order represents a natural sequence normally chosen by indoor wall climbers, which speaks to the external validity. Moreover, to ensure the climbers' security, we needed an easy route for warming up. Hence, we were not able to randomly change the order.

#### 4.4. Creating bridges between motivation and self-regulation

In our appreciation, motivation and self-regulation go hand in hand. However, the terms have been defined in different ways depending on the theory and research tradition. One approach that, in our view, provides a theoretically sound and easily applicable framework in sports, the work domain or education is the *Compensatory Model of Motivation and Volition* (Kehr, 2004). In a nutshell, the model proposes that one is optimally motivated if three motivational or structural components (i.e., implicit motives, explicit motives and perceived abilities) are in line with the current activity. When this is not the case, self-regulation or functional processes (volition, problem solving) need to compensate for the lack of motivational support. The model operates on a distal (trait-like) and a proximal (state-like) level and is briefly outlined below.

On the distal level, the three structural components are called implicit motives, explicit motives and perceived abilities. Implicit motives are defined as outlined in the introduction whereas explicit motives are seen as self-attributed. On other words, explicit motives are our convictions about what motivates us and are measured through self-report (cf. McClelland et al., 1989). Perceived abilities are seen as procedural knowledge and are similar to the concept of self-efficacy.

On the proximal level, aroused implicit motives are called affective preferences (i.e., experiencing an activity as pleasant and enjoyable), which are similar to intrinsic motivation (doing something for the sake of the activity). Aroused explicit motives (salient values, goals, intentions) lead to cognitive preferences (i.e., the activity is currently important to me) and are similar to extrinsic motivation (doing something in order to achieve an outcome). Perceived abilities, on the proximal level, are described as behavioural scripts (i.e., do I know how to execute the task, how to accomplish the activity). In applied contexts, such as management trainings, the metaphors head (cognitive preferences), heart (affective preferences) and hand (abilities) have been successfully used to illustrate the concepts (Kehr, 2009).

The model postulates that people are optimally motivated when affective preferences are aroused, no competing cognitive preferences are activated, and the abilities are perceived as sufficient (Kehr, 2004). For example, wall climbers with a high implicit achievement motive who engage in challenging climbing activities will experience affective preferences towards that activity and enjoy it. Moreover, if their cognitive preferences are in line with their affective preferences (the current activity is perceived as important or does not conflict with other cognitive preferences), they will be intrinsically motivated. For example, this would not be the case, if the climbers had a job interview the next day that they have not prepared yet (competing cognitive preferences). Finally, if, in addition to affective and cognitive preferences, the perceived abilities are in line with the activity, people will be able to experience flow. For example, experienced climbers will be more likely to execute the activity smoothly and without interruption because they possess adequate procedural knowledge. On the other hand, novices might be intrinsically motivated for climbing but will find it more difficult to experience flow

1 due to more frequent interruptions of their behaviour. They will need more problem solving in  
2 order to pursue the activity.

3 Of course, not all components can be fulfilled all the time. Therefore, the model includes the  
4 two functional processes of volition and problem solving. Kehr (2004) describes volition “as an  
5 array of self-regulatory strategies to support explicit action tendencies against competing  
6 behavioral impulses” (p. 485). Volition is needed to overcome internal barriers, when abilities  
7 are perceived as sufficient but the person lacks affective or cognitive preferences. For example, if  
8 a climber enjoys the wall climbing activity (affective preferences) but decides to not go climbing  
9 and to prepare instead for the next day’s job interview, volition might be used to suppress the  
10 temptation of climbing, to focus the attention on the task or to plan for an emotional reward once  
11 the task will be accomplished. It can also be used the cognitively support the importance of the  
12 job goal. Problem solving can be used to overcome external barriers. For example, novices will  
13 increase their climbing skills in order to establish a smoothly running action sequence.

14 In recent years, the concept of implicit/explicit motive congruence has received increased  
15 attention because it is associated with positive outcomes such as flow (Schüler, 2010) and life  
16 satisfaction (Hofer & Chasiotis, 2003). Incongruence, on the other hand, seems to be associated  
17 with negative outcomes such as reduced subjective well-being and increased psychosomatic  
18 symptoms (Baumann, Kaschel, & Kuhl, 2005). Rheinberg and Engeser (2010) proposed that  
19 motive congruence might be enhanced by *motivational competence*, which is knowing what  
20 situations or activities are perceived as intrinsically motivating. For example, affect focussed  
21 goal imagery has been shown to increase goal-motive congruence (Job & Brandstätter, 2009).  
22 Moreover, motive congruence in adults could be predicted by basic need supportive child rearing  
23 when the children where five years old (Schattke, Koestner, & Kehr, 2011). Finally, another way

1 to overcome barriers to self-knowledge and to increase motive congruence might be mindfulness  
2 training (Carlson, 2013).

3 Taken together, it seems that motivation and self-regulation go hand in hand. Self-knowledge  
4 can be used to actively engage in motivationally favourable activities. At the same time, the  
5 more often one experiences intrinsically motivating activities the more self-knowledge one can  
6 build, which, in turn, helps to self-regulate into motivating activities.

#### 7 **4.5. Conclusions**

8 Taken together, this field experiment demonstrates that the congruence between the  
9 achievement motive and achievement incentives provided by the situation increases flow. This  
10 supports the notion that the situation-person congruence leads to motivation in general and to  
11 flow in particular. The theoretical considerations and empirical findings lead to the suggestion  
12 that the motive-incentive congruence is another important precondition for flow. A route to flow  
13 might be enhancing one's self-knowledge and motivational competence, which in turn, will help  
14 to engage in motive congruent activities.

15

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3

Table 1

*Means, Standard Deviations, Internal Consistencies, and Correlations Between all Measures*  
( $N = 24$ )

<i>Variables</i>	Overall		Success		Failure		$\alpha$	2	3	4	5	6	7
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>							
1. Hope of Success	0.00	1.00	0.63	1.08	-0.37	0.74	-	-.03	-.08	-.10	.08	.15	.39
2. Fear of Failure	0.02	1.02	-0.52	0.76	0.35	1.94	-	-	-.12	-.12	<b>-.41</b>	-.08	-.34
3. Performance Level	6.71	0.89	7.08	0.82	6.45	0.89	-	-	-	.11	.37	<b>.52</b>	<b>.46</b>
4. Flow-Route 1	5.44	0.85	-	-	-	-	.85	-	-	-	<b>.62</b>	.29	.16
5. Flow-Route 2	5.70	0.89	-	-	-	-	.91	-	-	-	-	<b>.50</b>	<b>.57</b>
6. Flow-Route 3-first attempt	4.95	1.10	-	-	-	-	.92	-	-	-	-	-	<b>.65</b>
7. Flow-Route 3-second attempt	5.24	1.21	6.00	0.88	4.80	1.18	.93	-	-	-	-	-	-

*Note.* Bold values indicate significant correlations.  $rs \geq .41, p < .05$ ,  $rs \geq .52, p < .01$  (two-tailed).

*Success* refers to climbers who succeeded and *Failure* to those who failed Route 3-second attempt.

Route 1 was too easy; Route 2 was challenging (neither too easy not too difficult); Route 3 was too difficult.

